CONCENTRATED ALCOHOL CONSUMPTION BY HEAVY DRINKERS: ASSOCIATED RISKS & COSTS

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ACKNOWLEDGMENTS

The author would like to make a special acknowledgment of the integral work of Greenfield and Rogers on the topic of concentrated alcohol consumption [Greenfield, T.K. and Rogers, J.D. (1999). "Who drinks most of the alcohol in the U.S.? The policy implications." Journal of Studies on Alcohol, 60, 78-89] which contributed to the work presented here. This research was supported by funding from the California Department of Alcohol and Drug Programs.

EXECUTIVE SUMMARY

This paper was written in response to a request from the California State Department of Alcohol and Drug Programs (ADP) as part of a contract with the University of California at Los Angeles, Integrated Substance Abuse Program. Policy makers have long been interested in understanding the relationship between alcohol drinking patterns and alcohol-related problems, especially the associated societal and economic costs of drinking. Over the past 30 years, research on drinking patterns in the United States has revealed that a small percentage of the heaviest drinkers (e.g., 5%) account for as much as 50% of all alcohol consumed (Moore and Gerstein, 1981). This finding has frequently been cited in the literature (Greenfield and Rogers, 1999; Klein and Pittman, 1994; Malin *et al.*, 1982; Room, 1970). The topic has evolved as an important index in analyses of the economics of alcohol marketing, sales and distribution, as well as an indicator used to identify those who may benefit most from alcohol treatment and prevention efforts. Accordingly, this paper accomplishes the following:

1. ***Reviews U.S. studies of alcohol consumption patterns.***
2. ***Discusses data regarding risks to heavy drinkers.***
3. ***Reviews data regarding beverage preference and hazardous use.***
4. ***Reports data regarding the economic costs of heavy drinking.***
5. ***Summarizes findings and recommends interventions and policies.***

Highlights of Findings

Except where noted, this paper defines a "drink" as a beverage containing approximately 0.5 ounce of pure ethanol, (e.g. 4 oz of wine, 12 oz of beer or a 1.5 oz shot of spirits) and "volume" refers to the amount of alcohol (pure ethanol.)

- Greenfield and Rogers (1999)[1] found that the top 2.5% *of drinkers* by volume (mean of 9.1 drinks per day) accounted for 27% of the alcohol consumed by adults in the U.S.[2] It is this group that can be considered concentrated alcohol users.

- When considering all adult abstainers and drinkers, 75% of adults account for only 6% of adult alcohol consumption (Greenfield and Rogers, 1999). The concentrated alcohol user contrasts with the majority of adults who drink less heavily or not at all.

- Estimates vary, but the most recent study suggests that the top 5% of drinkers account for 42% of the nation's total alcohol consumption (Greenfield and Rogers, 1999). 3

- The top 25% of drinkers account for 87% of all alcohol consumed by adults 18 years and older. When combining drinkers and abstainers, 5% of the population consumed 53%, while the top 25% consumed over 94% of all adult alcohol consumed.

- The concentrated alcohol user is most likely to be a young man. Young drinkers are both disproportionately represented in the heaviest drinking groups and account for a disproportionate

amount of alcohol consumed by that group. Eighteen to 29 year olds comprise 27% of the population, but account for 45% of all adult drinking. This age group accounts for 63% of the heaviest drinkers.

- Younger concentrated users are more likely to drink beer than wine or spirits, and account for a larger proportion of alcohol-related accidents and increased rates of fatal traffic accidents.

- Concentrated alcohol users drink at a level and frequency that puts them at greatly increased risk for health and psychiatric problems, and morbidity and mortality.

- Beer drinking accounts for the large majority (81%) of hazardous drinking amounts (hazardous drinking defined as five or more drinks in a row). For the top 5% of heavy drinkers, beer accounted for more than half (55%) of all hazardous alcohol consumption.

- Concentrated alcohol users place an economic burden on society, the majority of which (55%) falls on those other than the drinker.

- Recent estimates indicate that alcohol abuse in the U.S. costs $184.6 billion, the large majority of this (73%) due to lost productivity; most of the remaining cost is due to alcohol treatment, medical consequences of alcohol consumption and administrative costs related to alcohol-related traffic accidents.

- Price increases are associated with decreased consumption, but vary with consumer age. For example, alcohol prices have less impact on college drinkers than on other groups, and consumption by male college students is essentially unresponsive to price.

- Increases in the price of beer have little effect on beer consumption - a key fact since most hazardous alcohol use is found among younger male beer drinkers.

- Since alcohol consumption seems unresponsive to price increases in the concentrated alcohol user, the State's attempt to modify negative consequences and costs through taxation are limited.

Recommendations

- Prevention and intervention strategies should focus on concentrated alcohol users, and industry marketing practices which support excessive, heavy use. The fact that heavy users are disproportionately comprised of young men suggests that prevention and intervention efforts might best be directed at this group.

- Prevention reduces adverse personal, social, health and economic consequences resulting from problematic alcohol availability, manufacture, distribution, promotion, sales and use, thereby fostering safe and healthy environments for individuals, families and communities.

- Although not well-studied, social norms marketing is a recently considered approach that may have benefits for the young male concentrated alcohol user. 4

- The fact that heavier drinking young men exhibit a preference for beer, coupled with the increased incidence of hazardous use of beer, suggests that prevention and intervention strategies should focus on, among other factors, the consumption, marketing and pricing of beer.

- Results of the Harvard College Alcohol Study (CAS) suggest that additional policy efforts to control underage drinking may be effective and feasible.

- If policymakers want to consider using taxation as an intervention to decrease alcohol consumption and traffic fatalities, they should keep in mind that beer consumption is more resistant to price increases than wine and spirits.

- Last, policymakers should also consider that, since concentrated alcohol users prefer beer, the beer industry would suffer the most negative impact financially if intervention and preventive efforts were successful. 5

INTRODUCTION

This paper was written in response to a request from the California State Department of Alcohol and Drug Programs (ADP) as part of a contract with the University of California at Los Angeles, Integrated Substance Abuse Program. Policy makers have long been interested in understanding the relationship between alcohol drinking patterns and alcohol-related problems as well as the associated individual, societal and economic costs of drinking.

Over the past 30 years, research on drinking patterns in the U.S. has revealed that a small percentage of the heaviest drinkers (i.e. 5% of adult drinkers) account for as much as 50% of all alcohol consumed (Moore and Gerstein, 1981). This consistent finding of an extreme concentration of alcohol consumption within a very small segment of heavy drinkers has frequently been cited in the literature (Greenfield and Rogers, 1999; Klein and Pittman, 1994; Malin *et al.*, 1982; Room, 1970). Hence, concentrated alcohol consumption in heavy drinkers has evolved as an important index in analyses of the economics of alcohol marketing, sales and distribution, as well as an indicator used to identify populations that may benefit most from alcohol treatment and prevention efforts. In response to ADP's request, this paper accomplishes the following:

1. ***Reviews U.S. studies of alcohol consumption patterns.***
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Alcohol Consumption Studies

Early Studies

In one of the first available studies of alcohol consumption patterns, Room (1970) found that heavy drinkers, which he defined as those individuals who drank 5 or more drinks at a time at least weekly, accounted for 6% of the population (including non-drinkers) and drank 41% of all alcohol consumed. In addition, the heaviest drinking 10% of the population under study reported consuming 60% of all alcohol consumed. Similar findings were reported in a 1982 study performed by the National Institute of Alcohol Abuse and Alcoholism (Malin *et al.*, 1982), which found that the highest 10% of drinkers (6.5% of all adults) accounted for approximately half of all self-reported alcohol consumption in the U.S.

A higher estimate was provided in a study that found that the heaviest drinking 5% of the total population accounted for approximately 50% of total consumption (Moore and Gerstein, 1981). In addition, these authors found that the heaviest drinking third of drinkers accounted for more than 95% of the total amount of alcohol consumed.[6] Together, these findings indicate that the rates of concentrated alcohol consumption in heavy users account for a disproportionate amount of total alcohol consumption.

Recent Studies

Most recently, Greenfield and Rogers (1999)[7] found that the top 2.5% of drinkers by volume (mean of 9.1 drinks per day) accounted for 27% of the alcohol consumed by adults in the U.S.[8] In addition, the top 5% of drinkers (4.2 drinks per day) accounted for 42% of alcohol consumed by adults. Further highlighting this extreme alcohol consumption is the finding that the top 25% of drinkers who consume more than 5 drinks a week accounts for 87% of all alcohol drunk by U.S. adults (Greenfield and Rogers, 1999). In other words, 75% of the U.S. adult drinking population, who drink less than 5 drinks per week, account for only 13% of alcohol consumed by adults.

Because these statistics are conservative due to the exclusion of abstainers (32.7%), Greenfield and Rogers re-examined these measures using drinkers and non-drinkers combined. The inclusion of abstainers increased the proportion of alcohol consumed. Using this strategy, the top 2.5% of the drinking population was estimated to consume 35% of all alcohol consumed by adults. In addition, the top 5% was found to consume 53%, while the top 25% consumed over 94% of all adult alcohol consumed. In other words, when considering the total adult population (abstainers and drinkers), 75% of adults account for only 6% of all adult alcohol consumption.

In a separate national data set, Greenfield and Rogers (1999) analyzed the 1990 National Alcohol Survey data (NAS), which utilizes a face-to-face interview format to compare results with the telephone survey methodology used in the first study. Although results from this sample of 1,308 drinkers revealed slightly lower volumes at all levels, there were no statistical differences between the two studies. In the NAS analysis, the top 2.5% of drinkers by volume (more than 5.9 drinks per day) consumed 25% of the alcohol consumed, while the top 5% of drinkers drank 39% of the alcohol consumed.

Gender

The effects of gender and age on alcohol consumption were also examined by Greenfield and Rogers (1999). An analysis of gender revealed that men account for the large majority of alcohol consumed, especially at higher volumes, with 8 times as many men as women categorized as the heaviest drinkers. Women were found to consume only 24% of the alcohol in the U.S. The top 2.5% of heavy drinking women accounted for only 3% of the alcohol consumed in the U.S., in comparison to heavy drinking men, who consumed 24%.

A large-scale analysis of 16 population surveys from 10 countries found consistent gender effects regarding alcohol consumption and alcohol-related problems (Wilsnack *et al.*, 2000). Although men and women were just as likely to drink, results indicated that for each of 74 comparisons across all 10 countries, men reported greater alcohol consumption and increased risk of alcohol-related problems than women. In regard to quantity and frequency, men consistently exceeded women in their average drinking frequency and average quantity per drinking occasion. These results replicated the finding of increased consumption and adverse consequences in men.

Age

Age effects were also observed (Greenfield and Rogers, 1999). Analyses revealed that young adults aged 18-29, who represent 27% of the population, but account for 45% of all adult drinking, were disproportionately represented among those individuals in the top 2.5% who drank above an average of 6 drinks per day. Adults aged 60 and over were underrepresented in the heaviest drinking group. Eighteen to 29 year olds represented 60% of the heaviest drinking group's consumption and accounted for 63% of its members.

Conversely, adults age 60 and over, who comprise 22% of the adult population, are more frequently categorized as lighter than average drinkers and consume only 10% of the nation's alcohol. This group accounts for only 3% of the alcohol consumed by the heaviest drinkers.

Study Limitations

The recent findings of Greenfield and Rogers provide further evidence that a small group of very heavy alcohol drinkers account for a large percentage of the alcohol consumed in the U.S. However, while there is a measure of consistency in the findings from the studies reviewed, it is important to note that the majority are limited by sample size, sampling design, and/or data collection strategies, factors that can decrease reliability and generalizability when trying to estimate alcohol consumption patterns for the population of the U.S. Consequently, due to its particularly strong design and methodology, the following section will focus on findings from the National Longitudinal Alcohol Epidemiologic Survey (NLAES; Stinson et al., 1998).

National Institute on Alcohol Abuse and Alcoholism (NIAAA)

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) has conducted perhaps the most extensive study of alcohol consumption patterns and alcohol-related problems for the United States population. This study provides data from a large-scale representative sampling of American households in which 42,862 respondents age 18 and over participated from the contiguous U.S. and the District of Columbia. The National Longitudinal Alcohol Epidemiologic Survey, (NLAES; Stinson et al., 1998) has several design and methodological benefits that increase the reliability and validity of the findings presented:

- First, the size of the sample. This is perhaps the largest epidemiologic study ever conducted of alcohol consumption patterns in the U.S. Increased reliability and generalizability are two benefits of this sample size.
- Second, the NLAES utilized a complex multistage design that relied on primary sampling units, which were stratified according to sociodemographic criteria and were selected with probability proportional to size. This increases generalizability of the findings.
- Third, the NLAES employed face-to-face interviews, which potentially increases the reliability of the self-reported data. [9]

NLAES Highlights

The following describes the alcohol use pattern estimates in the general population highlighting data from the NLAES.

- Rates of alcohol consumption within the last year for: 1) abstainers (34% of U.S. adult population); 2) light drinkers (43.7% of adults that drink); 3) moderate users (38.3% of adults that drink); and 4) heavier users (16.9% of adults that drink).
- Within each drinking category, data for each gender.
- Within each drinking category, data for ages: 18-24, 25-44, 45-64, 65 years and older.
- Within each drinking category, demographic data regarding race, education level, and Socioeconomic Status (SES).
- Within each drinking category, data regarding cigarette use within the past year.

National Longitudinal Alcohol Epidemiologic Survey

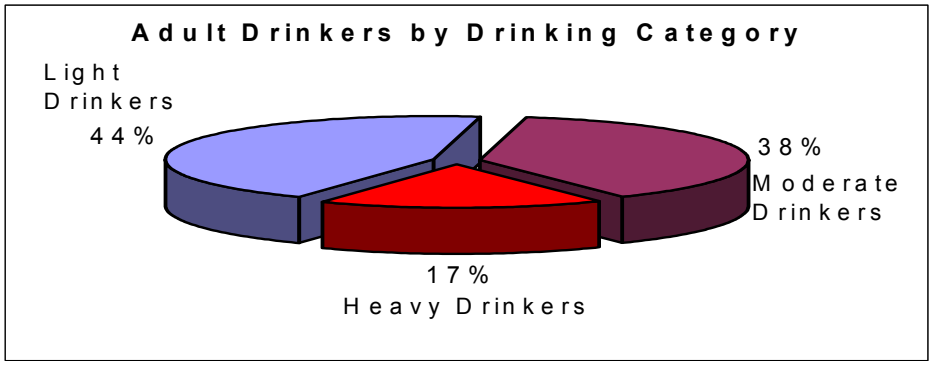
The data from the NLAES is presented as a percentage of the demographic group, not as a percentage of the drinking category, e.g. 54.2% of the women that did drink were Light Drinkers, ***not*** *54.2% of Light Drinkers were women. This is because each respondent fell into only one drinking category, but was a member of each of the five demographic groups: gender, age, race/ethnicity, education level, and socioeconomic group.*

Percentages may not equal 100% due to rounding.

Abstainers

A sizable proportion of the population abstains from alcohol use. A frequently reported and generally accepted statistic indicates that approximately 35% of the population is classified as abstainers (Hilton, 1986; Midanik and Clark, 1994). Data from the NLAES corroborate this finding with 34% of the population surveyed being classified as lifetime abstainers – defined as those who reported never drinking 12 or more drinks in any year during their lifetime.

Women were twice as likely than men to be classified as lifetime abstainers (45.3% and 21.7%, respectively). Last, 18.5% of abstainers smoked cigarettes in the past year.



Light Drinkers

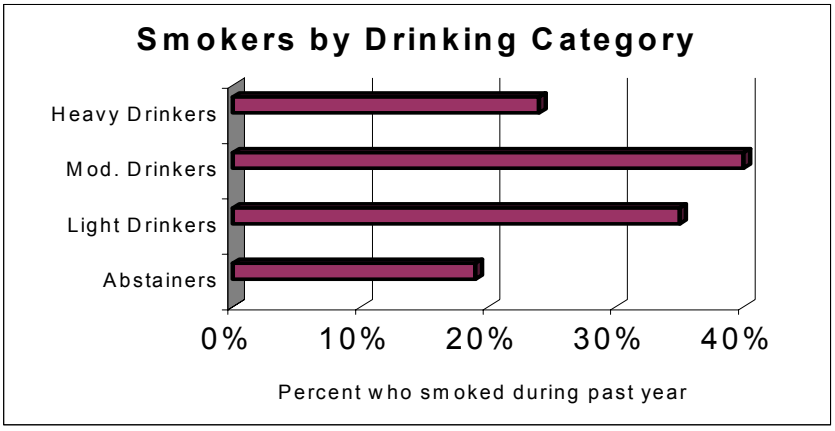
Light drinkers were categorized as those who drank at least 12 drinks in the past year but less than 0.22 ounces per day (e.g., fewer than 3 drinks per week on average). Light users accounted for 43.7% of all current drinkers. Women were approximately 1½ times more likely to be categorized as light drinkers than men (54.2% of women and 36.8% of men that drank.) Last, 35.3% of light drinkers smoked cigarettes in the past year.

Moderate Drinkers

Moderate drinkers were categorized as those who drank at least 0.22 ounces, but less than 1.00 ounce per day (e.g., 3 to fewer than 14 drinks per week on average). Moderate drinkers accounted for 38.3% of all current drinkers. Women and men were relatively evenly represented (34.9% and 40.5%, respectively). Last, 40.1% of moderate drinkers smoked cigarettes in the past year.

Heavier Drinkers

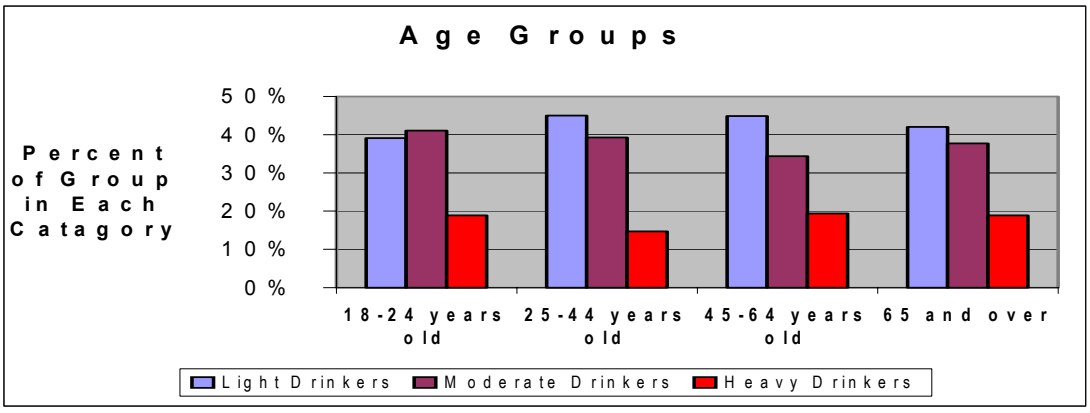
Heavier drinkers were those who drank at least 1.00 ounce a day (e.g., 2 or more drinks per day on average). Heavier drinkers accounted for the smallest percentage of all drinkers (16.9%). Men were twice as likely than women to be classified as heavier drinkers (21.5% and 9.9% of those that drank, respectively). Last, 23.6% of heavier drinkers smoked cigarettes in the past year.



Age

The 18-24 age group (37.0%) and those 65 and older (52.2%) were more likely to be abstainers than the middle age ranges. The percentages of the age groups in each of the light, moderate, and heavy drinkers categories were similar:

Age Groups	Abstainers (% of total population of each age group)	Light Drinkers (% of drinkers in each age group)	Moderate Drinkers	Heavy Drinkers
18-24 years old	**37.0%**	**39.1%**	**41.1%**	**18.9%**
25-44 years old	**26.5%**	**45.0%**	**39.3%**	**14.7%**
45-64 years old	**33.9%**	**44.9%**	**34.4%**	**19.4%**
65 and over	**52.2%**	**42.0%**	**37.7%**	**18.9%**

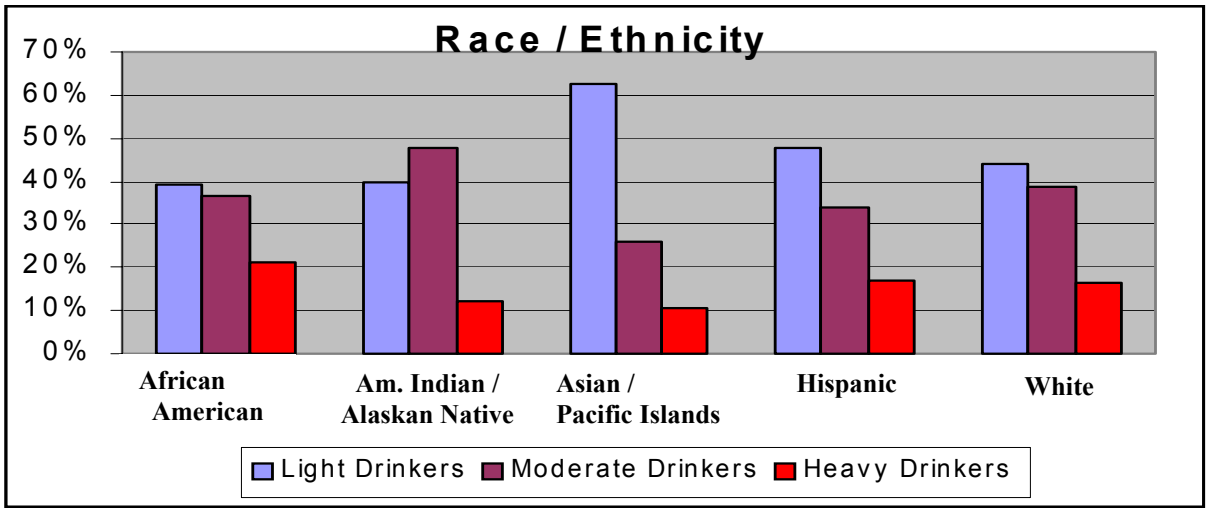


Race / Ethnicity and Drinking Category

Ethnic minorities were more likely than Whites to abstain from drinking. With the exception of higher rates for Asian/Pacific Islanders (62.7%), the other ethnic groups had similar percentages of light drinkers. American Indian/Alaska Natives were significantly *more likely* to be classified as moderate drinkers and Asian/Pacific Islanders were significantly *less likely*. Last, Asian/Pacific

Islanders (10.5%) and American Indian/Alaska Natives (12.3%) were slightly less likely to be heavier drinkers:

Race / Ethnicity	Abstainers (% of total population of each ethnic group)	Light Drinkers (% of drinkers in each ethnic group)	Moderate Drinkers	Heavy Drinkers
African American	**48.7%**	**39.5%**	**36.5%**	**21.3%**
Am. Indian/Alaska Native	**33.4%**	**40.0%**	**47.7%**	**12.3%**
Asian/Pacific Islander	**63.3%**	**62.7%**	**25.9%**	**10.5%**
Hispanic	**46.8%**	**47.5%**	**34.0%**	**17.0%**
White	**30.7%**	**43.8%**	**38.7%**	**16.5%**

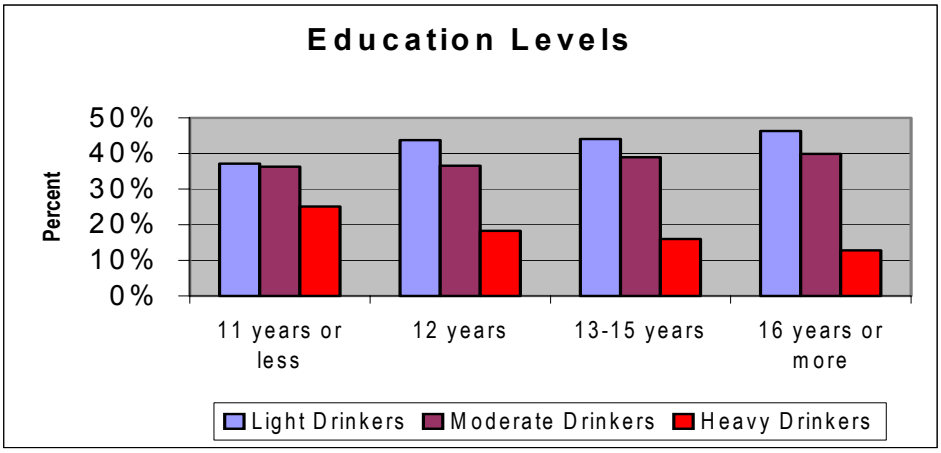


Education Levels

A negative relationship was observed between education and abstention. As education increased, rates of abstention decreased. A very subtle positive relationship between education and light drinking was observed. All education levels had similar percentages of moderate drinkers.

Similar to the pattern observed in abstainers, a negative relationship was observed between education and heavier drinking. As education increased, rates of heavier drinking decreased:

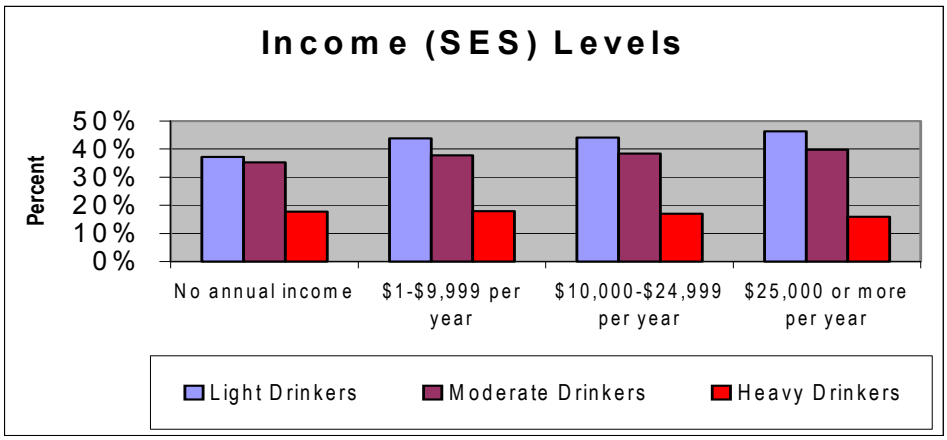
Education Level Attained	Abstainers (% of total population of each education level)	Light Drinkers (% of drinkers in each education level)	Moderate Drinkers	Heavy Drinkers
11 years or less	**49.5%**	**37.2%**	**36.3%**	**25.1%**
12 years	**36.2%**	**43.8%**	**36.6%**	**18.3%**
13-15 years	**28.2%**	**44.1%**	**39.0%**	**16.0%**
16 years or more	**23.6%**	**46.3%**	**39.9%**	**12.8%**



Income Levels

The rate of abstention declined as socioeconomic status (SES) rose, as measured by personal annual income. A fairly equal distribution by annual income was observed within the group of light drinkers. Similarly, SES was evenly distributed among moderate drinkers. No relationship was observed between SES and heavier drinking status:

Income (SES)	Abstainers (% of total population of each income level)	Light Drinkers (% of drinkers in each income level)	Moderate Drinkers	Heavy Drinkers
No annual income	**49.5%**	**37.2%**	**35.3%**	**17.7%**
$1-$9,999 per year	**36.2%**	**43.8%**	**37.8%**	**17.9%**
$10,000-$24,999 per year	**28.2%**	**44.1%**	**38.4%**	**17.0%**
$25,000 or more per year	**23.6%**	**46.3%**	**39.8%**	**15.9%**



College Binge Drinking

Recent data from 14,138 student responses from the Harvard School of Public Health College Alcohol Study (CAS) indicated that in 1999, two out of every five students (44%) were classified as binge drinkers.[10] This pattern of hazardous alcohol consumption remained stable from an earlier study in 1993. However, the rates of both abstention and binge drinking frequency decreased significantly in 1999, where 19% abstained from alcohol use and 23% reported binge drinking. Binge drinking, and particularly frequent binge drinking, was related to increased rates of alcohol-related problems.

The strongest predictions of binge drinking are the use of beer as the preferred drink, low price, and easy availability. Frequent binge drinkers consume an average of 17 drinks per week, more than two-thirds of all the alcohol college students drink. They also account for more than three-fifths of the most serious alcohol-related problems on campus.

In summary, this review of national alcohol consumption patterns reveals that a substantial proportion of the population abstains from alcohol use (34%) with abstainers more likely to be non-White. Among those who do drink, women are 1½ times more likely to be categorized as light drinkers than men. Heavy drinkers account for the smallest percentage of all current drinkers (16.9%), and men are twice as likely as women to be classified as heavier drinkers. Although a negative relationship between education and heavier drinking was observed, no relationship was observed between socioeconomic status and heavier drinking. Finally, a relationship was observed between cigarette smoking and drinking levels. The largest proportion of cigarette smokers was observed among light and moderate drinkers.

Beer Drinking - the Majority of Hazardous Alcohol Use

Drinking Preferences - Beverage-specific issues may be important to understanding hazardous consumption, and this was examined in the NLAES dataset. Of the 65% of current drinkers with a preference for beverage type:

41.0% reported a preference for beer
14.3% preferred wine
9.4% preferred liquor [11]

Examination of the 1995/96 National Alcohol Survey, a national study of adults 18 years and older from the contiguous 48 states, found that beer accounted for 67% of alcohol consumption in the prior year. Wine accounted for only 13%, and spirits for 20% (Rogers and Greenfield, 1999).

Drinking Volume - Furthermore, of the alcohol consumed by all drinkers, the 2.5% of heaviest drinkers by volume[12] accounted for 20% of all alcohol consumed. The top 5 percent of drinkers by volume, represents 32% of annual alcohol consumption.

Hazardous Use - An analysis of hazardous drinking found that while wine accounted for 4% of all alcohol consumed in hazardous amounts and spirits for approximately 16%, beer accounted for 81% (Rogers and Greenfield, 1999).[13] Furthermore, the 5% of heaviest drinkers by volume[14] accounted for more than half (55%) of all hazardous alcohol consumed, and 32% of annual alcohol consumption. Beer was the only alcoholic beverage of the three to significantly predict 12-month health, social, and alcohol dependence problems.

The finding of a relationship between patterns of beer drinking and mortality, (deaths from myocardial infarctions, and deaths from external causes) provides further evidence that the pattern of alcohol consumption may have an effect on health that is independent of total alcohol consumption. Whether or not this finding generalizes to college binge drinking has yet to be determined.

Studies have consistently documented the finding that drivers involved in alcohol related crashes, and convicted or arrested for driving while intoxicated, are most frequently beer drinkers (Gruenewald *et al.*, 2000). In addition, preference for beer was associated with higher self-reported alcohol consumption, greater tendency to drive after drinking, and considering driving after drinking less serious (Berger and Snortum, 1985).[15]

Recent data from a telephone survey of 2,275 drinkers from six U.S. communities suggest that the relationship between beer and drunk driving is indirect and affected by variables associated with beer drinking (Gruenewald *et al.*, 2000). Analyses revealed that frequent consumers were more likely to drink outside the home, preferred beer to spirits and wine, and reported being more likely than others to drink and drive. However, beverage preferences were not directly associated with drinking and driving. Rather, beer drinkers tended to be heavier drinking young men, a sub-population that prefers to drink at bars and restaurants, presumably to maximize the social value of drinking while minimizing drinking expense by drinking beer.

Hazardous use of beer has also been associated with increased mortality in men (Kauhanen et al., 1997). In a 7-year longitudinal follow-up study of 1,641 men, those who drank 6 bottles of beer per occasion exhibited 3 times the risk of death than those who drank 3 or less beers per occasion. These authors stress that the strong association between beer bingeing and death suggests that beer bingeing may "involve triggers of severe acute events." [16]

The Center for Disease Control has defined heavy or binge drinking as five or more drinks on a single occasion in the last month. Most drinking males do not drink at this level. A California study found that of those males who drink, only 16% report binge drinking on a regular basis (California Department of Alcohol and Drug Programs, 1982). Another study found that only 10% of drivers reported a pattern of binge drinking (Perrine, 1990). Kennedy et al., (1996) interpret these facts to indicate that the presence of high blood alcohol content (BAC) in their sample of alcohol-related fatally injured drivers and DUI offenders suggests that the alcohol consumption patterns of this small number of drivers differs substantially from the patterns of the majority of "social drinkers." These authors conclude that high BACs in fatally injured alcohol-related drivers most likely indicates problematic alcohol consumption patterns and/or alcoholism.

Economic Costs of Concentrated Alcohol Use

The cost of illness (COI) is one method to evaluate the burden of a particular disease, such as alcohol abuse. The COI provides a means for expressing in dollar terms the multi-factored impact of a health problem. COI studies typically include measures of costs of health care services, productivity loss from illness and premature morbidity, and other expenditures and resource losses that can be ascribed to the health problem.

The most recent COI study on alcoholism in the U.S. estimated that the economic cost of alcohol abuse was $184.6 billion in 1998, and that this cost equals roughly $638 per man, woman and child living in the U.S. that year (Harwood, 2000).

The estimated cost of alcohol abuse is attributed to:

- 73% ($134.2 billion) lost productivity
- 10% ($18.9 billion) medical consequences of alcohol consumption
- 9% ($15.7 billion) administrative and property costs of traffic crashes
- 4% ($7.5 billion) treatment of alcohol abuse disorders
- 3% ($6.3 billion) alcohol-related criminal justice costs
- 1% ($1.5 billion) fire destruction
- 0.3% ($484 million) social welfare administration

A. Distribution of the Burden of Costs

Harwood (2000) also provided estimates of the distribution of the economic costs of alcohol abuse across segments of the population. This calculation, which used data from a 1992 study, indicated that the majority of the economic burden of alcoholism fell on portions of society outside of the drinker (55% of total).

The estimated distribution of costs are:

- ***45% on the alcohol abusers and their families*** [17]
- ***20% on the federal government***
- ***18% on state and local governments***
- ***10% on private insurance***
- ***6% on victims of crime and non-drinking victims of alcohol-related vehicle crashes***

These cost estimates have limitations. First, because they are estimates they cannot be considered precise. Many estimated components are unobservable, so the magnitude of cost must be based on theoretical models and statistical inference (NIAAA, 2000). Second, the estimates do not include the human suffering caused by alcohol abuse such as failed marriages, career difficulties, and the emotional pain of having a loved one disabled or killed. Third, estimates of the economic burden of abuse reflect only adverse consequences and do not consider the benefits of moderate consumption, including health and enjoyment (NIAAA, 2000).

B. The Effects of Price and Taxation on Alcohol Consumption

Although it is generally agreed that increases in alcohol prices decrease consumption, there is conflicting data on the effect of prices on younger populations. Alcohol prices have been found to be a less significant factor in drinking behavior of college students than in other groups. Male college students' drinking is almost completely unresponsive to price (Chaloupka and Wechsler, 1996). However, in underage college women, price had a negative and significant impact on drinking. Similarly, beer taxes were found to have a relatively small and insignificant effect on teen drinking (Dee, 1999).

Earlier studies reported that young people are sensitive to alcohol price and that heavier drinkers are more price sensitive than light drinkers (Coate and Grossman, 1988; Grossman et al., 1987).[18] Price increases also have less impact on the demand for beer than for wine or spirits. "Price elasticity" is an index of the effect that price changes have on the demand for a product, and is defined as the percentage change in the quantity demanded that results from a 1% change in price (NIAAA, 2000). A 1993 study found that a 1% increase in price was related to a 0.3% decrease in demand for beer, a 1% decrease in demand for wine, and a 1.5% decrease in demand for spirits (Leung and Phelps, 1993). More recently, data indicated that alcohol demand was not as responsive to price changes as previously thought (Nelson, 1997).

C. Price Effects on Traffic Fatalities

The literature indicates that alcohol price increases have modest effects on overall consumption and more substantial effects on traffic fatality rates. One study of 49,199 individuals found that a 10% increase in price would decrease the number of binge drinking episodes per month by about 8% (Sloan et al., 1995). Another study examined the relationship between price and consumption and found that consumption in extremely heavy drinkers was unresponsive to price increases (Manning et al., 1995). These findings indicate that the effect of tax increases on consumption would be limited among the heaviest drinkers, and that this would probably translate into a modest effect on traffic fatalities in this group. Tax increases could still have a beneficial impact on decreasing drunk driving among less heavy drinkers.

Summary & Recommendations

Several studies have consistently found that a small proportion of alcohol users consume a disproportionate amount of alcohol. This group of heavy users is comprised largely of young men who prefer beer, and their level of consumption has serious public health implications. This includes increased traffic fatalities, medical consequences, and increased mental health problems. In addition, the concentrated alcohol user places a heavy economic burden on society. Given that beer accounts for the large majority of hazardous drinking and is preferred by young men who account for the majority of alcohol consumption, prevention and intervention efforts may best be directed at them. Consequently, successful prevention and intervention can be expected to have a heavier impact on the beer industry than on the wine or spirit industry. Exacerbated health and other risks among the heaviest consuming drinkers indicates a need to specifically tailor prevention and interventions to reach this population.

Alcohol Consumers

Studies of alcohol consumption patterns over the last 30 years have consistently found that a relatively small minority of very heavy drinkers account for a disproportionately large amount of alcohol consumption.

- Over a third of the population abstains from drinking. Forty-four percent of those that do drink are light drinkers (an average of fewer than 3 drinks a week) and 38% of those that do drink, drink moderately (an average of 3-14 drinks a week).

- Although estimates vary, the most recent study suggests that the top 5% of drinkers account for 42% of the nation's alcohol consumption (Greenfield and Rogers, 1999).[19]

Drinking Adults

- The top 25% of drinkers account for 87% of all alcohol consumed by adults 18 years and older. This means that 75% of the adult drinking population in the U.S. accounts for only 13% of adult alcohol consumption.

All Adults

- When combining drinkers *and* abstainers, the top 5% was found to consume 53%, while the top 25% consumed over 94% of adult alcohol consumption. In other words, considering all adults (abstainers and drinkers), 75% account for only 6% of all alcohol consumed (Greenfield and Rogers, 1999). This concentrated alcohol user contrasts with the majority of adult alcohol consumers who drink less heavily or not at all.

Gender

- The concentrated alcohol user is most likely to be a young man. In both the U.S. and other countries, men account for the large majority of alcohol consumption. This is especially true at higher volumes, with 8 times as many men as women categorized as the heaviest drinkers.

- Women are more likely to abstain from alcohol than men, and one study found that women accounted for only 24% of alcohol consumed in the U.S.

Age

- Young drinkers are both disproportionately represented in the heaviest drinking group and account for a disproportionate amount of alcohol consumption by that group. Eighteen to 29 year olds comprise 27% of the population, but account for 45% of all adult drinking. This age group comprises 63% of the heaviest drinkers.

- The incidence of hazardous binge drinking in college students has remained stable for the past few years.

- Older adults account for only 3% of the amount consumed by the heaviest drinkers.

Risks

- Concentrated alcohol users drink at a level and frequency that puts them at greatly increased risk for health and psychiatric problems, and exhibit increased morbidity and mortality.

- Younger concentrated users are more likely to drink beer than wine or spirits, and account for a larger proportion of alcohol-related accidents and increased rates of fatal traffic accidents.

- Beer drinking accounts for the large majority of hazardous drinking (81%). Beer drinking by the top 5% of heavy drinkers accounted for more than half (55%) of all hazardous alcohol consumption.

Economic Impact

- Concentrated alcohol users place an economic burden on society, the majority of which falls on those other than the drinker (55%).

- Recent estimates indicate that alcohol abuse in the U.S. costs $184.6 billion. The majority of this cost (73%) is lost productivity – most of the remaining cost is for alcohol treatment, medical consequences of alcohol consumption, and administrative costs for alcohol-related traffic accidents.

Price

- Price increases are associated with decreased consumption, but this varies with consumer age. For example, alcohol prices have less impact on college drinkers than on other groups. Consumption by male college students is essentially unresponsive to price, and the price of beer has little impact on teen drinking.

- Alcohol price increases have modest effects on overall alcohol consumption.

- Increases in beer price has little effect on beer consumption - a key fact since most hazardous alcohol use is found among younger male beer drinkers.

- Alcohol consumption appears unresponsive to price increases in the concentrated alcohol user, which means that the State's capacity to modify these consequences and costs through taxation are limited.

Recommendations

- Prevention and intervention strategies should focus on concentrated alcohol users, and industry marketing practices which support excessive, heavy use. The fact that heavy users are disproportionately comprised of young men suggests that prevention and intervention efforts might best be directed at this group.

- Prevention reduces adverse personal, social, health, and economic consequences resulting from problematic alcohol availability, manufacture, distribution, promotion, sales, and use, thereby fostering safe and healthy environments for individuals, families and communities.

- Although not well-studied, social norms marketing is a recently considered approach that may have benefits for the young male concentrated alcohol user. [20]

- The fact that heavier drinking young men exhibit a preference for beer, coupled with the increased incidence of hazardous use of beer, suggests that prevention and intervention strategies should focus on the consumption, marketing, pricing, etc., of beer.

- Results of the Harvard College Alcohol Study (CAS) suggest that additional policy efforts to control underage drinking may be effective and feasible.

- If policymakers want to consider using taxation as an intervention to decrease alcohol consumption and traffic fatalities, they should keep in mind that beer consumption is more resistant to price increases than wine and spirits.

- Last, policymakers should also consider that, since concentrated alcohol users prefer beer, the beer industry would suffer the most negative impact financially if intervention and preventive efforts were successful.[21]

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ENDNOTES

[1] Defined as 4 oz glass of wine, a 12 oz can of beer, or a 1.5 shot of spirits; telephone survey of 4,784 drinkers.

[2] Researchers used the standard approach of quantifying alcohol consumption by assuming equivalency of alcohol content for a "drink."

[3] The top 5% of drinkers by volume is indexed by quantity X frequency measures that approximate equivalency of alcohol content by defining a drink as a 4 oz glass of wine, a 12 oz can or bottle of beer, or a 1.5 oz shot of spirits (Greenfield and Rogers, 1999).

[4] This intervention uses a non-confrontational educational approach to reduce binge drinking by correcting misperceptions about the social norms of binge drinking and capitalizing on the drive to conform to social norms. (Perkins *et al.*, 1999) This presumes that accurate information regarding social norms will lead to a decrease in binge drinking by a move towards conformity with peer behavior. Although, this approach is currently being used in about one-fifth of college campuses (Smith, 2001), some experts argue that the approach may minimize the seriousness of binge drinking by educating others to the fact that binge drinking is not engaged in by the majority. Others argue that the approach may have limited success with small, heavy-drinking groups, such as fraternities or athletic teams. This is because the norms for heavy drinking within the group are more influential than the social norms for the majority. Some data suggest this may be the case (Carter and Kahnweiler, 2000). Nonetheless, this approach may hold promise for large segments of concentrated alcohol users and requires further evaluation.

[5] It should be noted that there is some controversy in the field regarding the most appropriate focus of prevention and intervention. Proponents of the prevention paradox argue for population-based rather than risk-group strategies (Gmel *et al.*, 2001; Skog, 1999).

[6] Discrepancies in these studies may be related to sampling strategies, differing definitions of heavy users, and/or changes in drinking patterns over time.

[7] Defined as 4 oz glass of wine, a 12 oz can of beer, or a 1.5 oz. shot of spirits; telephone survey of 4,784 drinkers.

[8] Researchers used the standard approach of quantifying alcohol consumption by assuming equivalency of alcohol content for a "drink."

[9] It should be noted that a procedure similar to that used by Greenfield and Rogers (1999) was used to assume equivalence of ethanol content for a "drink" for quantity X frequency measures [amount of pure ethanol in each drink was converted by the following calculations: .45 for beer, .48 for wine, and .409 for liquor; (Age, 1992; Kling, 1989; Kling, 1991; Turner, 1990)].

[10] As defined by the consumption of five or more drinks on one occasion for men and four or more drinks for women (Wechsler *et al.*, 2000).

[11] (Stinson *et al.*, 1998)

[12] 6 or more drinks per day on average, with a drink defined as a 4 oz glass of wine, a 12 oz can or bottle of beer, or a 1.5 oz shot of spirits

[13] "hazardous drinking days" is defined as days in which five or more drinks were consumed by beverage type

[14] 6 or more drinks per day on average, with a drink defined as a 4 oz glass of wine, a 12 oz can or bottle of beer, or a 1.5 oz shot of spirits

[15] In comparison to those who preferred other alcoholic beverages in a telephone survey of 1,000 licensed drivers over the age of 16

[16] The strong association between beer bingeing and deaths from external causes was exhibited at 7 times the rate of non-bingers; myocardial infarction was more than 6 times that of non-bingers

[17] Mainly due to decreased earnings

[18] When evaluating relationships between alcohol price and taxation policies, it is important to recognize that alcohol excise tax rates are not routinely increased to compensate for the impact of inflation. Consequently, the inflation adjusted tax rates have declined over a large proportion of the postwar period, with the exception of a significant tax increase in 1991. Thus, the "erosion" of what can be considered the "real tax rate" has led to overall declines in actual beverage prices over time (NIAAA, 2000).

[19] The top 5% of drinkers by volume is indexed by quantity X frequency measures that approximate equivalency of alcohol content by defining a drink as a 4 oz glass of wine, a 12 oz can or bottle of beer, or a 1.5 oz shot of spirits (Greenfield and Rogers, 1999).

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